

VIDEO/AUDIO COMBO DEVICE

FIELD OF THE INVENTION

The present invention relates to a video/audio combo device adopted for using on
5 portable electronic data processing devices such as a personal digital assistant (PDA),
handheld computer, notebook computer, mobile phone and the like to provide picture
taking and audio outputting functions.

BACKGROUND OF THE INVENTION

10 Personal electronic data processing devices such as a PDA, handheld computer,
notebook computer, and mobile phone mainly aim to enable users to process electronic
messages anytime anywhere. In recent years, with fast developments of the wireless
communication environments, these portable electronic devices have gradually the
concept of 'mobile office' realized.

15 The portable electronic data processing devices mainly focus on two aspects: first,
slim and light; second, powerful function in a small size. The slim and light aim to make
carrying easy. The powerful function aims to provide sufficient functions at users'
disposable without limiting their work. At present, most portable electronic data
processing devices already meet the requirements 'slim and light', and 'powerful
20 function'. However, with growing developments of multimedia technologies, many
portable electronic data processing devices also try to provide multimedia applications,
such as installing a sound generating element on the portable electronic data processing
device, to generate a corresponding sound while processing multimedia files. Or
installing a picture taking element (such as CCD or CMOS) on the portable electronic
25 data processing device to enable users to take pictures anywhere anytime and store the

pictures in the portable electronic data processing device.

Take the mobile phone for instance, the conventional simple buzz cannot meet user's requirements anymore. These days, many mobile phone producers have developed application software that can broadcast musical buzz or songs. The sound generating
5 element generally is a Mylar speaker bonding closely to one side of the case. As the case does not have resonant space, the Mylar speaker cannot produce desirable audio quality even if it can broadcast musical buzz or songs.

Moreover, in the past most picture taking elements were fixedly located on the portable electronic data processing devices such as mobile phones, PDAs, or notebook
10 computers. They were not convenient. Now Sony has introduced a PDA model PG-NX80V/G and a notebook computer model PCG-TR2T that have a rotary video lens to enable users to rotate the video lens as desired to take pictures. However, the rotary video lens takes a lot of space.

15 **SUMMARY OF THE INVENTION**

In view of the aforesaid disadvantages occurred to the portable data processing device, such as the Mylar speaker cannot generate musical buzz or songs with a desirable audio quality due to no resonant space caused by size limitation of the portable data
20 processing device, and the trend of making the rotary video lens a standard feature on the portable data processing device, the present invention takes into account multimedia applications to provide a video/audio combo device that uses the rotary video lens to provide a resonant space for the Mylar speaker.

The video/audio combo device according to the invention mainly includes a housing shell, a picture taking element and at least one sound-generating element. The housing
25 shell is located on a portable electronic data processing device that has a viewfinder

window and a sound exit port. The picture-taking element and the sound-generating element are jointly housed in the housing shell corresponding respectively to the viewfinder window and sound exit port. The picture-taking element can be used to take pictures and record the pictures in the portable electronic data processing device. When
5 the portable electronic data processing device processes multimedia files, it can generate a corresponding sound through the sound-generating element. As the housing shell has an interior space that functions as a resonant space for the sound-generating element, an improved audio output can be achieved.

In one aspect, the video/audio combo device according to the invention has a picture
10 taking element and a sound-generating element housed in the housing shell together, to utilize the space of the housing shell more effectively. Meanwhile, the space in the portable electronic data processing device that was originally occupied by a sound-generating element may be freed for other use. Hence designers and producers of the portable electronic data processing device can better use the space to make the whole
15 device even slimmer and lighter. And the resonant space for the sound-generating element can provide an optimal audio output effect for multimedia applications.

The foregoing, as well as additional objects, features and advantages of the invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

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BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of the invention adopted for use on a PDA.

FIGS. 2, 3 and 4 are schematic views of a first embodiment of the invention.

FIGS. 5A and 5B are schematic views of a second embodiment of the invention.

25 FIGS. 6A, 6B and 6C are schematic views of a third embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The video/audio combo device according to the invention is adopted for use on a portable electronic data processing device such as a PDA, handheld computer, notebook
5 computer, mobile phone and the like that is a personal electronic data processing device easy to carry.

Refer to FIG. 1 for an example of the invention adopted for use on a portable electronic data processing device. The video/audio combo device 10 according to the invention is installed on a portable electronic data processing device 20 (a PDA is
10 illustrated in the drawing). The video/audio combo device 10 may be fixedly installed on the portable electronic data processing device 20 and users can turn the portable electronic data processing device 20 to take pictures. The video/audio combo device 10 may also be installed on the portable electronic data processing device 20 in a rotary manner to enable users to turn the video/audio combo device 10 to take pictures. The
15 following embodiments are based on the rotary video/audio combo device 10.

Refer to FIGS. 2, 3 and 4 for a first embodiment of the invention. The video/audio combo device 10 includes a housing shell 11, a cap 12, a picture-taking element 13 and a sound-generating element 14.

The housing shell 11 is substantially a hollow cylindrical member which has one end
20 closed and sealed and another end opened. The closed end is extended in the center to form an axle 111 to couple on a portable electronic data processing device 20 (the coupling method is not shown in the drawings) to serve as the axis of one end of the housing shell 11. The perimeter surface of the housing shell 11 has a viewfinder window 112 and an audio exit port 113. The cap 12 mates the shape of the housing shell
25 11 and may be coupled on the opened end thereof. The cap 12 has another end

extending to form a cap axle 121, which is coupled on the portable electronic data processing device 20 (the coupling method is not shown in the drawings) to serve as the axis of another end of the housing shell 11 so that the cap 12 is coupled on the housing shell 11. The axle 111 and the cap axle 121 are coupled on the portable electronic data processing device 20 in a turning manner. The cap 12 further has a wire outlet 122.

The picture-taking element 13 is a picture-taking device, which includes a lens 131 and a photosensitive element 132. The photosensitive element 132 may be a charge-coupled device (CCD) or a complementary metal-oxide semiconductor (CMOS) for recording light variation to generate image signals. The picture-taking element 13 is housed in the housing shell 11 with the lens 131 corresponding to the viewfinder window 112. The picture-taking element 13 further has a connection line 133 connecting to the photosensitive element 132. The connection line 133 may be a flexible print circuit (FPC) or a cable, passing through the wire outlet 122 of the cap 12, to connect to a circuit (not shown in the drawings) of the portable electronic data processing device 20, for signal transmission.

The sound-generating element 14 is a Mylar speaker for receiving signals to generate sound. It is housed in the housing shell 11 and corresponds to the audio exit port 113. It also has a connection line 141 connecting to the connection line 133 to electrically connect to the portable electronic data processing device 20 to receive audio signals from the portable electronic data processing device 20 and generate sound.

Referring to FIG. 4, the housing shell 11 contains the picture-taking element 13 and the sound-generating element 14. The interior space of the housing shell 11, after deducting the space occupied by the picture-taking element 13, has a remained space which may serve as a resonant space of the sound generating element. Thus the sound-generating element 14 may achieve an optimal audio output effect.

Refer to FIGS. 5A and 5B for a second embodiment of the invention. In this

embodiment, the audio exit port 113 is located on the closed end of the housing shell 11. It may be adopted on different types of the portable electronic data processing device 20.

Refer to FIGS. 6A, 6B and 6C for a third embodiment of the invention. It is a double sound track video/audio combo device 10a. The housing shell 11a is substantially a hollow cylindrical member, which has one end closed and another end opened. The closed end has a wire outlet 114a. The opened end is extended axially to form an extension 115a, which has a wire exit trough 116a. The housing shell 11a further has a viewfinder window 112a. A picture-taking element 13a is housed in the housing shell 11a corresponding to the viewfinder window 112a. The picture taking element 13a has a connection line 133a, extending through the extension 115a and winding the extension 115a for a number of times to connect to a portable electronic data processing device 20, so that the connection line 133a does not interrupt turning of the housing shell 11a. The opened end of the extension 115a is coupled with a spacer 15a, which has a wire outlet 151a. A first cap 12a and a second cap 16a are provided to mate the hollow shell 11a. The first cap 12a and the second cap 16a are hollow barrels that have one end closed and other end opened. The opened ends of the first cap 12a and the second cap 16a are coupled respectively on the extension 115a and the closed end of the housing shell 11a. The closed ends of the first cap 12a and the second cap 16a have respectively an axle 123a and 161a, and an audio exit port 124a and 162a. The axles 123a and 161a are coupled on the portable electronic data processing device 20 so that the housing shell 11a is turning on the portable electronic data processing device 20. There are a first sound-generating element 14a and a second sound generating element 17a located respectively in the first cap 12a and the second cap 16a corresponding to the audio exit ports 124a and 162a. The first sound-generating element 14a and the second sound generating element 17a have respectively a connection line 141a and 171a, running through the wire outlets 151a and 114a to electrically connect to the connection line

133a, to receive audio signals from the portable electronic data processing device 20.

Referring to FIG. 6C, in the third embodiment of the invention, the first sound-generating element 14a and the second sound generating element 17a are located respectively in the first cap 12a and the second cap 16a, and are located on the left side and the right side of the housing shell 11a. The first cap 12a and the second cap 16a serve as the resonant chests of the first sound generating element 14a and the second sound generating element 17a. Thereby, an optimal two sound tracks audio output effect may be achieved.

While the preferred embodiments of the invention have been set forth for the purpose of disclosure, modifications of the disclosed embodiments of the invention as well as other embodiments thereof may occur to those skilled in the art. For instance, while the rotary housing shell has been adopted in the disclosed embodiments, the stationary housing shell may also be adopted. Accordingly, the appended claims are intended to cover all embodiments, which do not depart from the spirit and scope of the invention.